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ABSTRACT

Sex-related differences in mathematical problem solving performances and intellectual abilities were investigated. A battery of 19 "reference" tests for intellectual abilities and a mathematical problem solving test were administered to 82 fourth-grade females and 97 fourth-grade males. Sex-related differences were found for only two of the intellectual variables; neither of these were mathematics achievement variables. However, factor analytic procedures identified six factors (Verbal Comprehension, Induction, Numerical, Perceptual Speed, Symbolic Fluency, and General Mathematics) for females and five factors (Verbal Comprehension-Word Fluency, Induction, Perceptual Speed, Problem Solving and Mathematics Concepts) for males. These different intellectual structures suggested that males and females approach problem solving differently. (Author/MP)

Sex-Related Differences in Mathematical Problem Solving Performance and Intellectual Abilities

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This research represents further analyses of the author's dissertation study which was conducted under Professor Thomas Romberg at the University of Wisconsin.

Abstract

This study investigated sex-related differences in mathematical problem solving performances and intellectual abilities. A battery of 19 "reference" tests for intellectual abilities and a mathematical problem solving test were administered to 82 fourth-grade females and 97 fourth-grade males. Sex-related differences were found for only two of the intellectual variables; neither of these were mathematics achievement variables. However, factor analytic procedures identified six factors (Verbal Comprehension, Induction, Numerical, Perceptual Speed, Symbolic Fluency, and General Mathematics) for females and five factors (Verbal Comprehension-Word Fluency, Induction, Perceptual Speed, Problem Solving, and Mathematics Concepts) formales. These different intellectual structures suggested that males and females approach problem solving differently.

Sex-Related Differences in Mathematical

Problem Solving Performance and Intellectual Abilities

This study examined relationships between intellectual abilities and mathematical problem solving performance. In particular, the study attempted to identify any sex-related differences in the intellectual structures of mathematical problem solving of fourth-grade males and females.

Background

The study's inception and design are attributed primarily to A Structure of Concept Attainment Abilities Project (CAA) (Harris & Harris, 1973). The CAA study was conducted at the Wisconsin Research and Development Center for Cognitive Learning to determine a structure of concept attainment abilities. During 1970 and 1971, batteries of "reference" tests for cognitive abilities and tests to measure attainment or achievement of mathematics, social studies, science, and language arts concepts were administered by the CAA staff to samples of fifth-grade males and females. Factor analytic procedures were used to identify a basic cognitive abilities structure and to determine relationships between concept learning in the four selected school subjects and cognitive abilities. Harris and Harris (1973) summarized the results in the following manner:

> We conclude that seven latent cognitive abilities underlie the test batteries that were studied and that these are the same for boys and girls. The seven abilities are: Verbal,

Induction, Numerical, Word Fluency, Memory, Perceptual Speed, and Simple Visualization. The first six are six of the seven Primary Mental Abilities of the Thurstones. The seventh is similar to the Thurstone's Closure One but we prefer to call it Simple Visualization. [p. 169]

Furthermore, the CAA Staff found that

(1) Achievement in science and social studies was related to three abilities -- Verbal, Induction , and Memory.

(2) Achievement in language arts and mathematics was related to three abilities -- Numerical, Word Fluency, and Memory.

(3) Two abilities -- Perceptual Speed and Simple Visualization seemed not to be related to achievement in these four subject - matter fields. [Harris & Harris, 1973, p. 195]

Related Literature

A frequent generalization about mathematics performance is that girls achieve better in computation and boys excel at mathematical reasoning (Glennon & Callahan, 1968; Maccoby & Jacklin, 1974). Aiken (1971) claimed that sex differences in mathematical abilities are already present at the kindergarten level and undoubtedly earlier. However, after reviewing 36 studies concerned with sex-related differences in mathematics, Fennema (1974) concluded:

No significant difference between boys' and girls' mathematics achievement were found before boys and girls entered

elementary school or during early elementary years. In upper elementary and early high school years significant differences were not always apparent. However, when significant differences did appear they were more apt to be in the boys' favor when higher-level cognitive tasks were being measured and in the girls' favor when lower-level cognitive tasks were being measured. No conclusion can be reached concerning high school learners per se on the basis of the research reviewed here. (p. 136-137)

After an extensive review of studies of sex-related differences in mathematical problem solving, Schonberger (1976) commented, "The studies reviewed in this section indicate that the sex-related differences may be limited to the upper-ability level and to problems whose content is spatial or sex biased " (p. 64). In her own study, Schonberger (1976), while investigating the ability of seventh-grade students to solve mathematical and spatial problems, found almost no differences between boys' and girls capabilities.

In National Science Foundation sponsored studies, Fennema and Sherman (1977) and Sherman and Fennema (1977) found significant differences in mathematics achievement in favor of males in only two of four high schools. In addition, in grades 6-8, Fennema and Sherman (1978) found significant differences in favor of females on a low level mathematical cognitive task in one of four school areas tested. In another of the four school areas, significant differences were found in favor of males on a high level mathematical cognitive task.

Sex-Related Differences

A few studies used factor analytic techniques to investigate sex-related differences in mathematics achievement. One such example was the investigation of Very (1967) who administered a battery of 30 tests to 335 university students. All of Very's tests were chosen to measure abilities considered pertinent to mathematical ability. Data for the total group, for males only, and for females only, were analyzed by principal component procedures. Verbal, Numerical, Perceptual Speed, Spatial Ability, and General Reasoning factors were found for all three groups. In addition to the General Reasoning factor, Arithmetic, Deductive, and Inductive Reasoning factors were isolated for males only. Although three additional factors emerged also for females, Very found the factors difficult to define.

Other investigations which studied intellectual structures were conducted by graduate students at the Catholic University of America (Engelhard, 1955; Kliebhan, 1955; Campbell, 1957; Edwards, 1957; Donohue, 1957; Emm, 1959; & McTaggart, 1959). Batteries of tests, believed to be related to problem solving, were administered to groups of fifth, sixth and seventh-grade males and females. Verbal and Arithmetic factors were identified for each of the six groups. In addition, Campbell (1957) found a factor for sixth-grade males which involved a comparison of data prior to problem solving, Donohue (1957) found an Approach-to Problem Solving factor for seventh-grade males and females, Emm (1959) identified a Spatial factor for fifth-

grade males, and McTaggart (1959) found another Verbal factor for fifth-grade females.

The analytic studies of Very, the graduate students of the Catholic University of America, and the CAA Project suggested the existence of a somewhat stable intellectual structure of Verbal, Numerical, Reasoning, Spatial, Perceptual Speed, and Memory factors. How each of these factors related to mathematics achievement was not clear. Furthermore with these analytic studies, as well as the studies of Aiken (1971), Fennema (1974), Schonberger (1976), and Fennema and Sherman (1977, 1978), and Sherman and Fennema (1977), there were no consistent sex-related differences in mathematics achievement.

Procedures

Subjects

The subjects were 97 fourth-grade males and 82 fourth-grade females from Wisconsin, Illinois, and New York. The investigation was restricted to fourth-grade children who were studying Developing Mathematical Processes (DMP) (Romberg, Harvey, Moser, Montgomery, & Dana, 1974; Romberg, 1976), in order to ensure some similarity in experiential background for the sample. Moreover, the mathematical problem solving test was designed for children who were at least in the fourth-grade. The geographic area constraint was primarily for the convenience of the investigator.

Instruments

Twenty tests were administered. Of these tests, 19 were "reference" tests for intellectual abilities and the remaining tests was a mathematical problem solving test constructed by Romberg and Wearne (1975). The Romberg-Wearne test was designed to yield three scores: a comprehension score, an application score, and a problem solving score. To accomplish this, the test was composed of groups of items called superitems. Each of these superitems contained a comprehension question, an application question, and a problem solving question. An example of a superitem is given to illustrate the nature of the comprehension, application, and problem solving parts.

Example

A parking lot has room for 8 rows of cars with 9 cars parked in each of those rows. (Item Stem)

The parking lot has room for the same number of cars in each of 8 rows. (Comprehension Question)

TRUE FALSE

How many cars can be parked in the parking lot?_____ (Application Question)

In another parking lot, trucks are parked. Each truck takes the space of 3 cars. There are 12 trucks in the parking lot and it is completely full. If there were 4 rows in the parking lot, how many cars could be parked in each row?_____ (Problem Solving Question)

The comprehension question of the example ascertained whether a child understood the important information given explicitly in

the item stem. The application question can be answered by direct application of the data given in the item stem, that is, by merely multiplying 8 x 9 . In general, each application question of the superitems assessed a child's mastery of a prerequisite concept or skill of the problem solving question; the application question was a fairly straightforward application of some rule or concept to a situation. Whereas, each problem solving question posed a question whose solution was not immediately available, that is, a situation which did not lend itself to an immediate application of a rule or algorithm. In the example given, a child needed to multiply and divide to solve the problem question.

Although the primary objective of this study was to examine performances of males and females in problem situations similar to those found in the problem solving questions, the test also provided information about the samples' prerequisite computational skills and mathematics concepts for the problem solving questions. Therefore, three measures of the Romberg-Wearne test; a Comprehension score, and Application score, and Problem Solving score, were used in all analyses.

All reference tests, with the exception of Mathematics Computation (Romberg, 1975), were selected from the CAA battery. I attempted to select from this battery those tests I hypothesized as being related to problem solving. Also, since this was a factor analytic study, at least two reference tests for each hypothesized ability were included. Table 1 lists the 19 reference tests administered to

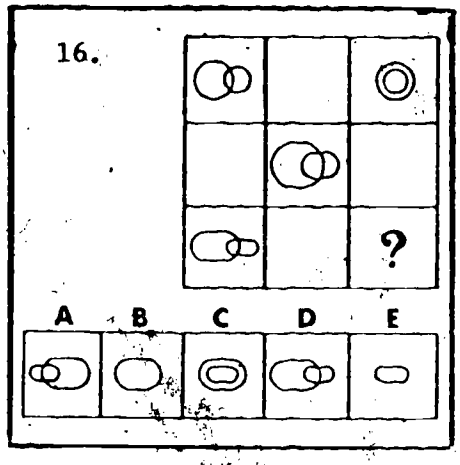
Place table 1 about here

the sample, indicates the intellectual abilities hypothesized for the respective reference test, and gives the source of each test.

Description of Reference Tests of Intellectual Abilities

Figure Matrix (1). In this test the subject is to infer two spatial relations (across and down), combine them, and select from five choices the figure that belongs in the cell with the question mark.

Example:

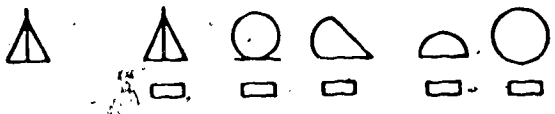


Gestalt Completion (2). This test involves naming an object from a partially obliterated picture of it.

Example:

Identical Picture (3). In this test the subject selects from five choices a figure which is identical to a given one.

Example:



Letter Classification (4). In each item of this test the subject is to infer a class from three given exemplars and add, from three choices, a fourth exemplar to that class.

Example:

B A B D	1. B C D E
D E B D	2. D C D B
C A D C	3. A B C A

Mathematics Computation (5). This test consists of problems of the following types: addition, subtraction, place value, ordering, finding the missing number, and respresenting parts of a whole.

Number Classification (6). In this test the subject is to examine the structure and form of three exemplars, infer a class to which all three exemplars belong, and then select another exemplar of that class from five given choices.

Example:

6	695	643	
5	75	885	
21	2	629	

A. 115
B. 82
C. 750
D. 16
E. 67

Number Exclusion (7). This test parallels the Number Classification test, but the task required in this test is exclusion rather than classification. The subject is to infer a class from three of the four given exemplars, and to indicate the one exemplar that is incorrect for that class.

Example: A. 42 B. 38 C. 32 D. 52

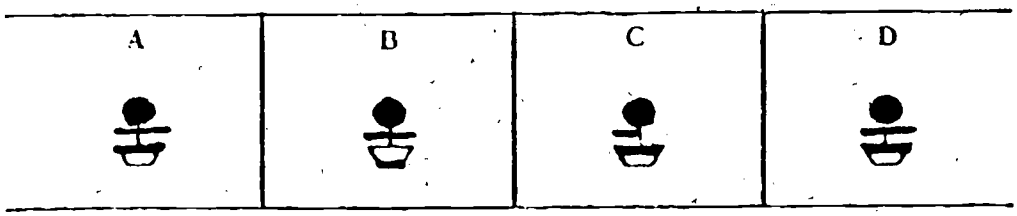
Number Series (8). Exemplars forming a series are given in this test. The subject must infer a quantitative rule and choose from five choices the number which would come next in the series.

Example: a 8 14 20 A. 16
B. 20
C. 22
D. 24
E. 26

Omelet (9). In this test words are given with the letters in scrambled order. The subject is to identify each word and spell the word correctly.

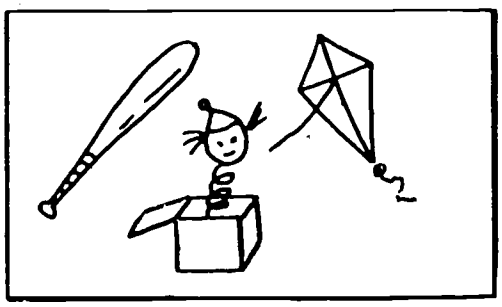
Perceptual Speed (10). This test involves the circling of the two identical pictures from four given figures.

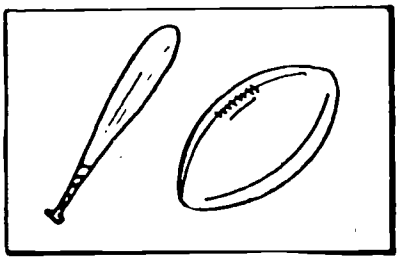
Example:

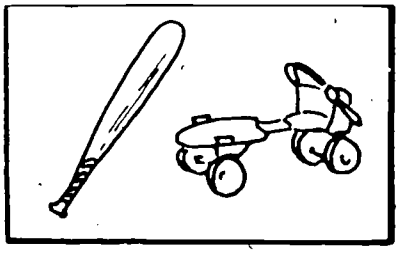


Picture Class Memory (11). In this test the subject studies ten sets of three pictures. The three pictures in each set are exemplars of a class. The subject infers the class, remembers it, and then judges whether or not 20 sets of two pictures each belong to a class that was studied.

Study Example:







Picture Group Name Selection (12). In this test three pictured exemplars of a class are given. The subject is to infer the class and select the best name for the class.

are all:

A. satellites
B. stars
C. planets

Remembering Classes: Members (13). For this test the subject studies 10 sets of three words. Immediately following the study period, she is asked to respond whether or not each of 20 sets of two words belongs to a class that was studied.

Example: A. iron
gold
nickel

I. nickel
lead _____

II. nickel
dime _____

Remote Class Completion (14). In this test the subject is to produce a fourth word that goes with three given words. The words all go together in some way, but the class is a remote one.

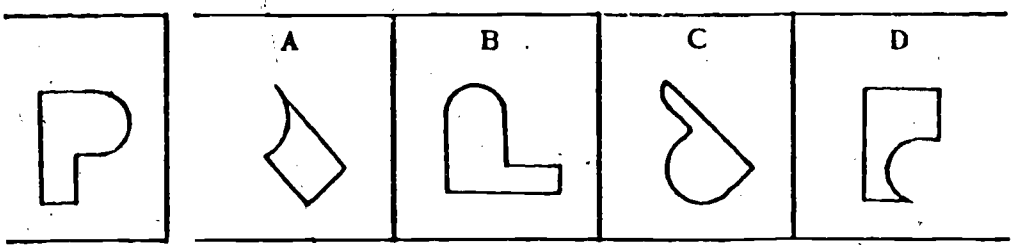
Example: right fist shake _____

Seeing Trends (15). In each item of this test four exemplars are given. The subject infers a rule based on number of letters or alphabetic position of letters, etc., of the four given exemplars. Using the rule inferred, the subject places the word which is given at the right in parentheses, in its proper serial position.

Example: hurt_____ joke_____ dear_____ barn (find)
A B C

Spatial Relations (16). From four choices the subject chooses the figure that would complete a given figure to form a square.

Example:



Spelling (17). In this test the subject is to select the misspelled word if there is one; or he is to select "no Mistakes" if each of the four words is spelled correctly.

Vocabulary (18). In each item of this test the subject is to select from four exemplars a synonym for the underlined word in a phrase.

Word Group Naming (19). In each item of this test four exemplars of a class are given. The subject must supply a name for the class.

Example: poodle
terrier
hound
collie are all_____

Results

Means, Standard Deviations, and Reliabilities

The GITAP program (Baker, 1969) was used to obtain means, standard deviations, and Hoyt analysis of variance reliability estimates for each of the 19 reference tests for intellectual

abilities and the three parts of the Romberg-Wearne Mathematical Problem Solving Test. These statistics are presented in Table 2.

Place Table 2 about here

The mean scores and standard deviations were similar for females and males. In fact, t-tests demonstrated that significant sex-related differences occurred for only the two intellectual variables, Spatial Relations and Picture Group Name Selection.

In general, the reliability estimates for the 19 reference tests for intellectual abilities were quite good. Only two estimates for males were lower than .70 and only one estimate for females was below .70 . The estimates for the Comprehension, Application; and Problem Solving parts of the Romberg-Wearne test were somewhat lower.

Single-Battery Factor Analysis

Since the primary aim was to investigate relationships among a large number of variables to determine structures of mathematical problem solving performance for females and males, factor analysis was deemed an appropriate procedure. In particular, the conservative approach to factor analysis of Harris and Harris (1973) was used.

After finding orthogonal and oblique rotations of the Alpha, Harris R-S^2, and Unrestricted Maximum Likelihood initial factor solutions of each of the two intercorrelation matrices, an interpretation strategy of Harris and Harris (1971) was applied to the

Orthogonal and three A'A Proportional to L oblique solutions. This interpretation strategy involves attempting to determine factors that are robust with respect to method--factors which tend to include the same variables across methods. A variable was considered relevant to a factor if it had a coefficient greater than .30 (absolute) on that factor. A comparable common factor was defined as one having two or more of the same relevant variables on at least four of the six derived solutions.

The Harris and Harris (1971) interpretation strategy yielded six comparable common factors for females and five comparable factors for males. Table 3 gives the loadings of the variables which were relevant to the respective comparable common factors. Those variables with loadings greater than .30 on at least four of the derived solutions are given in capital letters.

Place Table 3 about here

Table 4 presents a summary of the comparable common factors.

Place Table 4 about here

Discussion

The comparable common factors for males and females in Table 4 resemble the factors hypothesized; however, there are differences. The two hypothesized factors, Simple Visualization and Memory, were not isolated for males or females. Spatial Relations, one of the reference tests for Spatial Visualization, and Remembering Classes: Members, a reference test for Memory, helped to determine Induction factors for both sexes. Spatial Relations also helped to determine a Numerical factor for females. For the two reference tests, Spatial Relations and Remembering Classes: Members, it appeared that induction was more important than remembering for the memory test and visualizing for the Spatial Relations test.

The other memory test, Picture Class Memory, was not relevant to any factor. Whereas, Gestalt, the other Spatial Visualization factor, contributed significantly to a Problem Solving factor for males and a Perceptual Speed factor for females.

Furthermore, Numerical and Fluency factors were isolated for females and not males. Since Numerical factors have emerged consistently for both sexes in studies such as the CAA Project (1973) and Very (1967), this lack of emergence of a Numerical factor for males should not be taken too seriously before replication of the phenomena with similar samples. The Fluency factor which emerged for females differed somewhat from that which was identified for both sexes of the CAA study.

Even though the t-tests for each of the three parts of the Romberg-Wearne test were not significantly different, the roles played by these parts differed for males and females in the factor analytic procedures. The somewhat high means for the Comprehension and Application parts and low mean for Problem Solving suggested that comprehension of the data and mastery of the prerequisite mathematics concepts and skills did not guarantee successful problem solving for neither males or females. Yet, the relationships that existed between all three parts, together with Mathematics Computation, were sufficient to determine a General Mathematics factor for females. Whereas, for males, the Comprehension and Application parts determined one factor and the Problem Solving part, with Gestalt and Omelet caused a Problem Solving factor to emerge. One explanation for this sex difference in the number of comparable common factors determined by Comprehension, Applications, and Problem Solving is that females and males may have approached the problem solving situations differently. Perhaps the females relied more on academic achievement and experiences, that is, their methods for solving the problem situations may have paralleled their approaches to the Application parts. Males may have used established rules and algorithms for the Application parts, but used more of a Gestalt approach to the problem solving situations.

Limitations

Generalizability of the results was limited by the nonrandom sample, the battery of reference tests, and the difficulty of the problem solving questions. The Problem Solving means (Part III of the Romberg-Wearne test) were only 3.32 for males and 3.65 for females. The standard deviations were 2.19 and 2.63 respectively. That the study showed almost no relationship between intellectual abilities and problem solving may perhaps be attributed to these low problem solving scores.

Almost all of the reference tests were selected from a battery used by the CAA Project (Harris & Harris, 1973). The investigator attempted to select from these concept attainment tests those she believed to be related to problem solving. The selected battery accounted for 57.8% of the variance of the problem solving questions for females and 42.2% of the variance of the problem solving questions for males. The variances of the tests of mathematics concepts of the CAA study, accounted for by the complete battery of reference tests, ranged from .39- .59 for females and .40 - .61 for males. It appeared that the problem solving questions were as highly related to the "concept attainment tasks" as were many of the tests of mathematics concepts of the CAA study. This relationship was particularly significant for the females of this study.

Conclusions

This study does not support the generalizations of Glennon & Callahan (1968) and Maccoby and Jacklin (1974). Females and males performed equally well on all the tests of mathematics achievement. However, the results suggested that females and males may approach problem situations differently. That is, the sexes may prefer different intellectual processes for mathematical problem solving.

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TABLE 1

Intellectual Abilities Hypothesized for the Population Sample, The Respective Reference Tests and Their Sources

Intellectual Abilities	Reference Tests	Sources
Verbal	Pict. Group Name Sel. (12)[a]	Constructed by CAA[b] staff
	Word Group Naming (19)	Constructed by CAA staff
	Remote Class. Comp. (14)	Adapted from Waddle Test by CAA staff
	Vocabulary (18)	Iowa Tests of Basic Skills (1964)
Induction	Letter Classification (4)	Constructed by CAA staff
	Number Classifications (6)	Constructed by CAA staff
	Figure Matrix (1)	Sheridan Psychological Services (1969)
	Number Exclusion (7)	Constructed by CAA staff
Numerical	Mathematics Comp. (5)	Constructed by Romberg (1975)
	Number Series (8)	Constructed by CAA staff
	Seeing Trends (15)	Constructed by CAA staff
Word Fluency	Omelet (9)	Constructed by CAA staff
	Spelling (17)	Iowa Tests of Basic Skills (1964)
Perceptual Speed	Identical Pictures (3)	ETS Kit of Reference Tests (1962)
	Perceptual Speed (10)	PMA 4-6 Test Battery (SRA) (1962)
Simple Visualization	Gestalt Completion (2)	Constructed by CAA staff
	Spatial Relations (16)	PMA 4-6 Test Battery (SRA) (1962)

[a]Numbers in parentheses represent the alphabetical order of the tests. This order is used when describing the tests.

[b]CAA refers to A Structure of Concept Attainment Abilities Project (Harris & Harris, 1973).

TABLE 2

Means, Standard Deviations, and Reliability Estimates for Test Scores

		Number of Items	Mean		Standard Deviation		Hoyt Reliability	
			Males[a]	Females[a]	Males	Females	Males	Females
1	Figure Matrix	20	8.75	9.12	4.05	3.76	.76	.71
2	Gestalt Completion	20	12.65	11.72	3.64	3.64	.74	.75
3	Identical Pictures	48	26.06	27.26	8.52	9.93	.94	.95
4	Letter Classification	20	13.61	13.98	3.36	3.39	.71	.73
5	Mathematics Computation	54	39.81	41.33	8.20	8.00	.89	.89
6	Number Classification	30	23.75	24.74	6.15	5.18	.91	.89
7	Number Exclusion	20	13.53	14.30	4.03	3.95	.80	.81
8	Number Series	20	13.08	12.68	4.30	3.85	.83	.78
9	Omelet Test	20	10.04	10.65	5.11	4.91	.88	.87
10	Perceptual Speed	40	26.96	28.00	6.58	6.57	.89	.90
11	Picture Class Memory	20	15.54	15.54	2.87	3.18	.72	.79
12	Picture Group Name Selection	20	12.55	11.60	2.85	3.14	.57	.64
13	Remembering Classes: Members	20	14.10	13.56	3.26	3.62	.68	.74
14	Remote Class Completion	25	12.52	12.96	4.09	4.08	.77	.75
15	Seeing Trends	20	11.85	11.87	3.86	3.72	.74	.72
16	Spatial Relations	25	16.44	14.46	3.96	4.15	.74	.75
17	Spelling Test	38	24.08	24.34	7.20	6.44	.88	.85
18	Vocabulary Test	38	24.21	24.62	7.31	7.27	.89	.89
19	Word Group Naming	20	12.13	12.35	3.94	4.54	.75	.83
20	Comprehension	19	13.53	13.51	2.42	2.42	.47	.50
21	Applications	19	9.84	9.59	3.21	3.49	.66	.72
22	Problem Solving	19	3.32	3.65	2.19	2.63	.52	.64

[a]There are 97 males and 62 females

TABLE 3

Comparable Common Factors

TEST	Males						Females					
	Orthogonal			Oblique[b]			Orthogonal			Oblique[b]		
	A	H	U[c]	A	H	U	A	H	U	A	H	U
Comparable Common Factor 1 (B-CCF 1)												
.4 REMOTE	57	54	54	37	44	44	67	70	65	58	66	58
.7 SPELLING	73	79	71	66	67	65	59	59	54	54	53	50
.8 VOCABULARY	73	68	82	52	44	71	83	81	84	77	72	78
.9 WORD GROUP NAMING	66	54	61	47	33	44	70	69	71	51	48	53
11 APPLICATION	73	44	53	65			50	45	47		35	
5 MATH COMPUTATION	60	50	52	45		33						
6 NUMBER CLASSIFICATION	33	32	40			32						
8 NUMBER SERIES	50	33	35	41			33	33	31			
9 OMELET	55	60	57	45	57	48		37	34	32		
10 COMPREHENSION	69	39	41	61			32					
12 PICTURE GROUP NAME SELECTION	43						66	64	66	45	48	46
1 Figure Matrix							49	49	52			
2 Gestalt										36	32	
4 Letter Classification							34	36	37			
13 Remembering Classes: Members	46	36	39				30	33	35			
15 Seeing Trends				43								
22 Problem Solving	33						35	33	33			

TABLE 3 (Cont.)

Test	Males						Females					
	Orthogonal			Oblique[b]			Orthogonal			Oblique[b]		
	A	H	U[c]	A	H	U	A	H	U	A	H	U
Comparable Common Factor 2 (B-CCF 2)												
FIGURE MATRIX	66	71	66	64	57	58	57	55	50	52	53	37
PICTURE CLASS MEMORY	41		41	31		39	72	71	79	80	75	85
SPATIAL RELATIONS	56	50	53	48		45	63	62	59	52	57	37
LETTER CLASSIFICATION	71	60	75	72	50	77						
NUMBER CLASSIFICATION	48		46	40		41						
NUMBER EXCLUSION	56		52	53		48						
NUMBER SERIES	53	56	48	44	36	34						
PICTURE GROUP NAME SELECTION	33						43	45	42	49	44	47
REMEMBERING CLASSES: MEMBERS							46	42	40	47	39	38
WORD GROUP NAMING	39		38				39	39	37	38	33	35
Mathematics Computation	32											
Applications	37		35									
Problem Solving	35	33										
Comparable Common Factor 3 (B-CCF 3)												
NUMBER SERIES							63	58	64	70	59	76
SEEING TRENDS							61	62	57	66	65	76
SPATIAL RELATIONS							34	33	40	48	35	60

TABLE 3 (Cont.)

	Test	Males						Females					
		Orthogonal			Oblique[b]			Orthogonal			Oblique[b]		
		A	H	U[c]	A	H	U	A	H	U	A	H	U
1	Figure Matrix										33		40
22	Problem Solving								33		31		
Comparable Common Factor 4 (B-CCF 4)													
3	IDENTICAL PICTURES	66	68	51	66	66	47	83	78	81	82	76	79
10	PERCEPTUAL SPEED	77	70	99	77	70	99	59	62	67	56	64	64
2	GESTALT							57	51	54	56	47	53
5	Mathematics Computation								33	31		30	
15	Seeing Trends		32		33								
Comparable Common Factor 5 (B-CCF 5)													
9	OMELET	49	44	51	49	33	45						
2	GESTALT	60	56	51	62	44	49						
22	PROBLEM SOLVING		37	46		49	48						
8	Number Series			32									
15	Seeing Trends			39			37						

TABLE 3 (Cont.)

Test	Males						Females					
	Orthogonal			Oblique[b]			Orthogonal			Oblique[b]		
	A	H	U[c]	A	H	U	A	H	U	A	H	U
Comparable Common Factor 6 (B-CCF 6)												
6 NUMBER CLASSIFICATION							53	69	49	51	56	44
9 OMELET							40	32	51	35		45
17 SPELLING							37	33	38	31		
10 PERCEPTUAL SPEED							-38		-39	-32		-38
7 Number Exclusion							35			42		
Comparable Common Factor 7 (B-CCF 7)												
20 COMPREHENSION		67	89		91	99.5	63	67	65	59	56	61
21 APPLICATION		58	46		64	49	65	62	68	54	47	59
4 LETTER CLASSIFICATION							48	32	45	38	-38	36
5 MATHEMATICS COMPUTATION		34			32		65	51	64	52	42	57
7 NUMBER EXCLUSION							53	32	51	32		40
10 PERCEPTUAL SPEED							39		34	50		43
22 PROBLEM SOLVING		42					64	62	68	54	50	59
12 Picture G.N. Selection							31		31			
13 Remembering Classes: Members							36		38			
17 Spelling							34		37			

a Includes coefficients greater than .30 (absolute). Decimals have been omitted.

b $A'A$ proportional to L

c A(Alpha), H(Harris R-S^2), U(UMLFA)

TABLE 4

Summary of Comparable Common Factors

	Females	Males
B-CCF 1	Verbal Comprehension	Verbal Comprehension - and Word Fluency
B-CCF 2	Induction employing figural or pictorial content	Induction ~~employing~~ employing figural or numerical content
B-CCF 3	Numerical	
B-CCF 4	Perceptual Speed	Perceptual Speed
B-CCF 5		Problem Solving
B-CCF 6	Symbolic Fluency	
B-CCF 7	General Mathematics	Mathematics Concepts